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Tages

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(54) **CHAIN LIFT AND DERAILLEUR HOLD TOOL FOR BICYCLES**

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(51) **Int. Cl.**

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B25B 27/00	(2006.01)
B25B 27/22	(2006.01)

(52) **U.S. Cl.**

CPC ***B62M 9/128*** (2013.01); ***B25B 27/0071*** (2013.01); ***B25B 27/22*** (2013.01)

(58) **Field of Classification Search**

CPC B62M 9/128; B25B 27/14; B25B 27/22; B25B 27/0071

USPC 474/130

See application file for complete search history.

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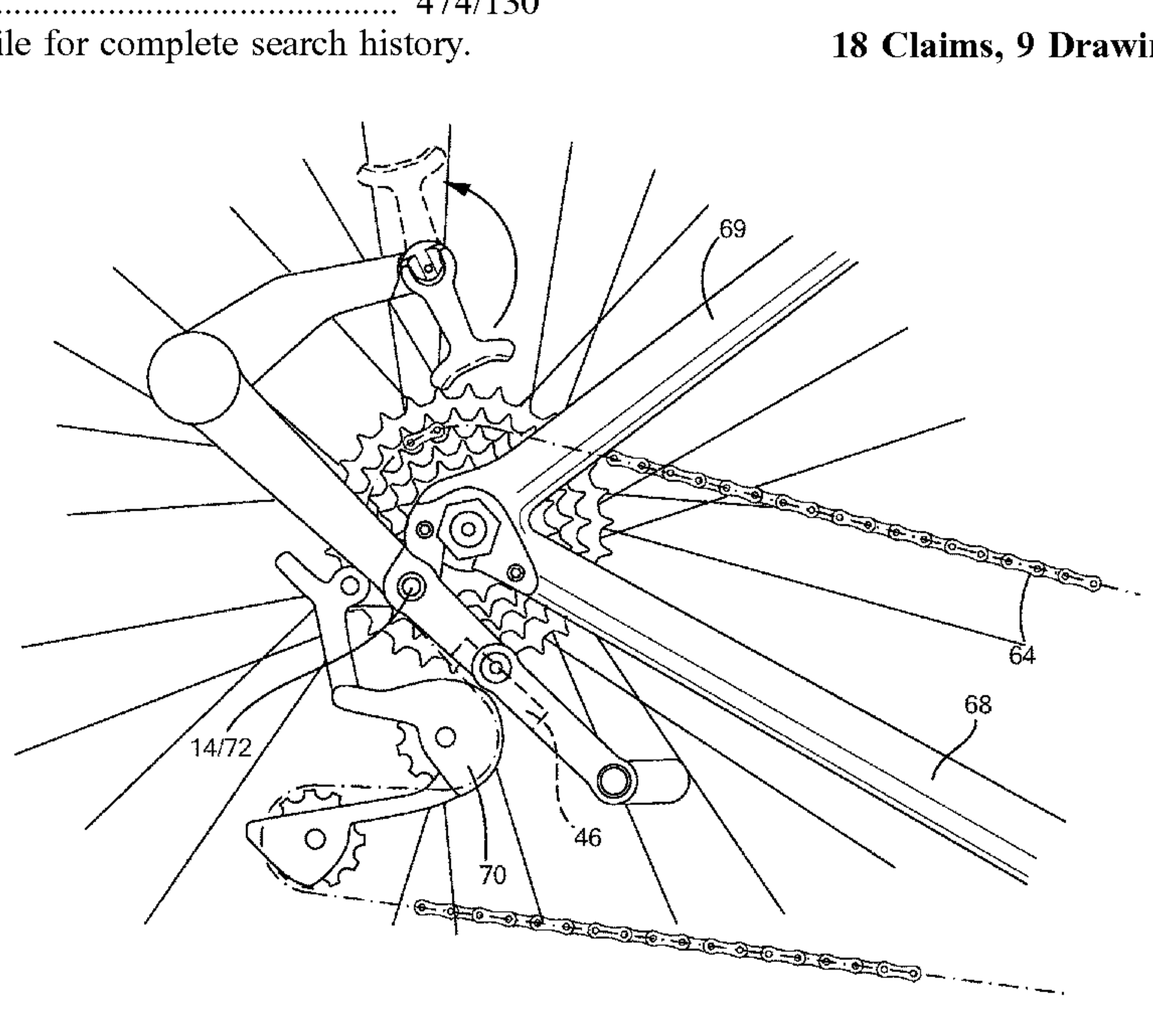
(57) **ABSTRACT**

A method and tool provide for removal of a rear bicycle wheel of a bicycle having a wheel with an axle mounted cassette of cogs. The tool includes a chain disengagement element movable with respect to an axle mounted cassette, wherein moving the chain disengagement element moves a portion of the chain away from the axle mounted cassette sufficiently to completely disengage the chain from the axle mounted cassette. This allows for easy removal of the wheel.

18 Claims, 9 Drawing Sheets



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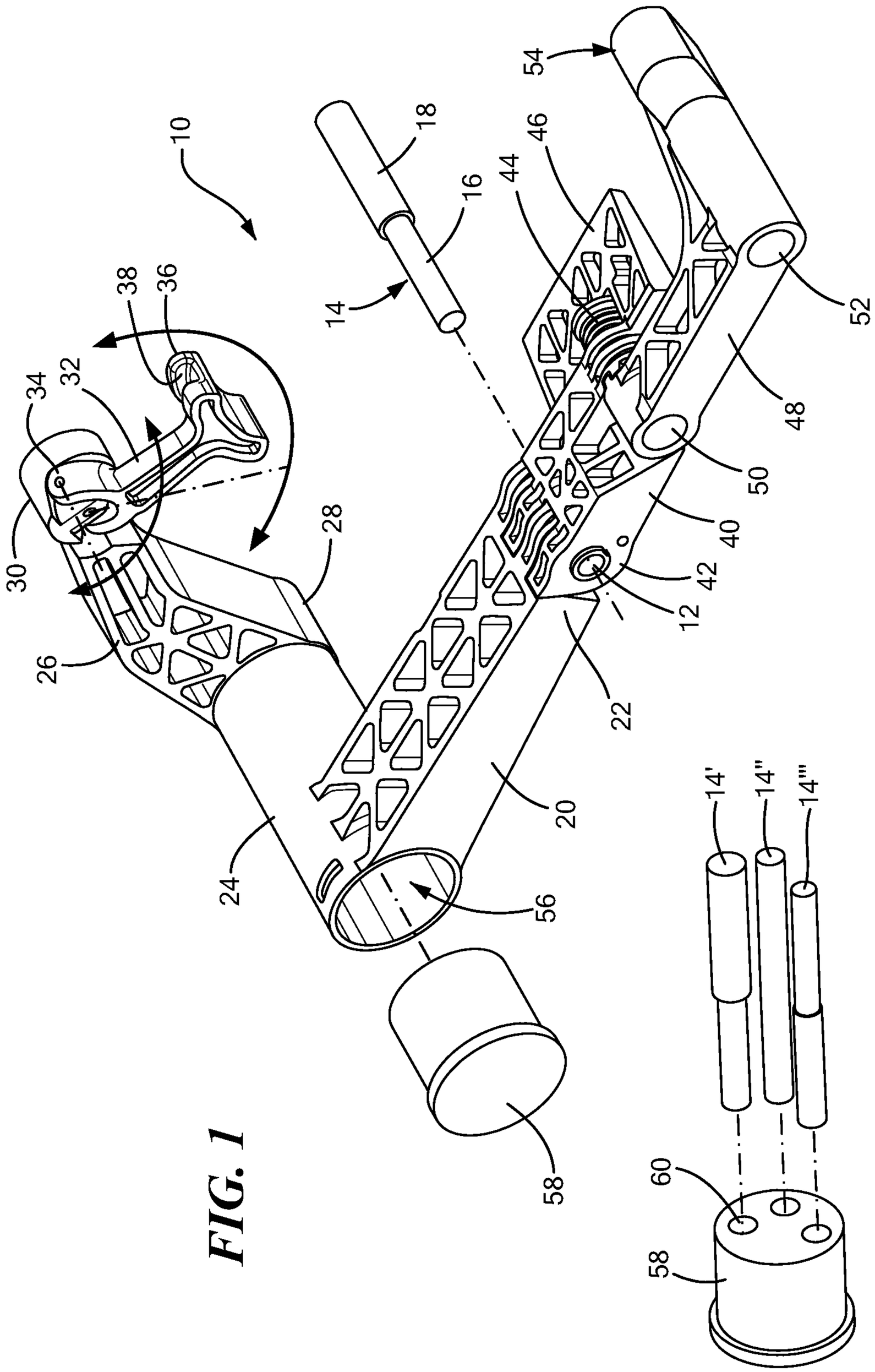
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FIG. 1

14'
14"
14'"
60
58

FIG. 1A

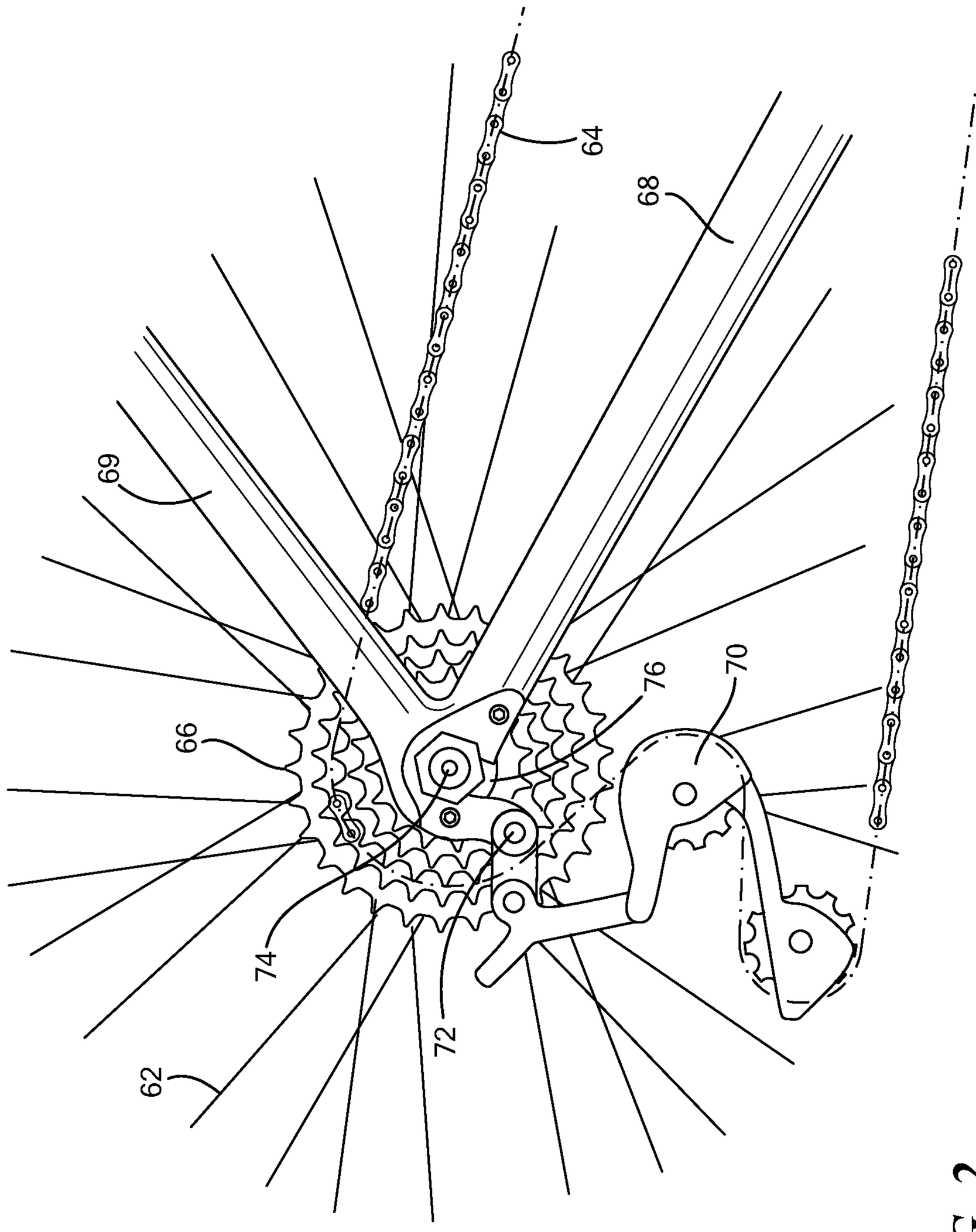

FIG. 2

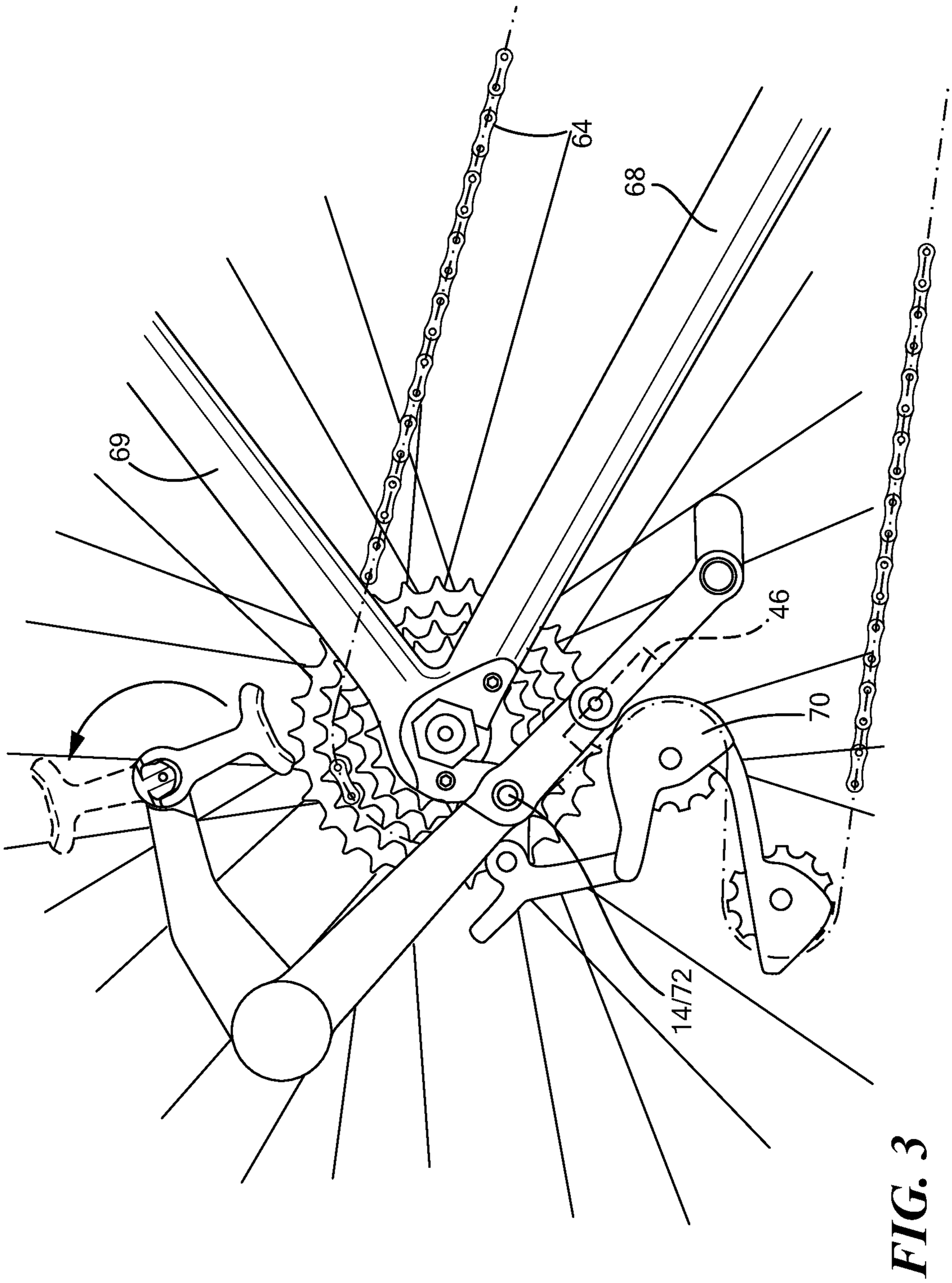

FIG. 3

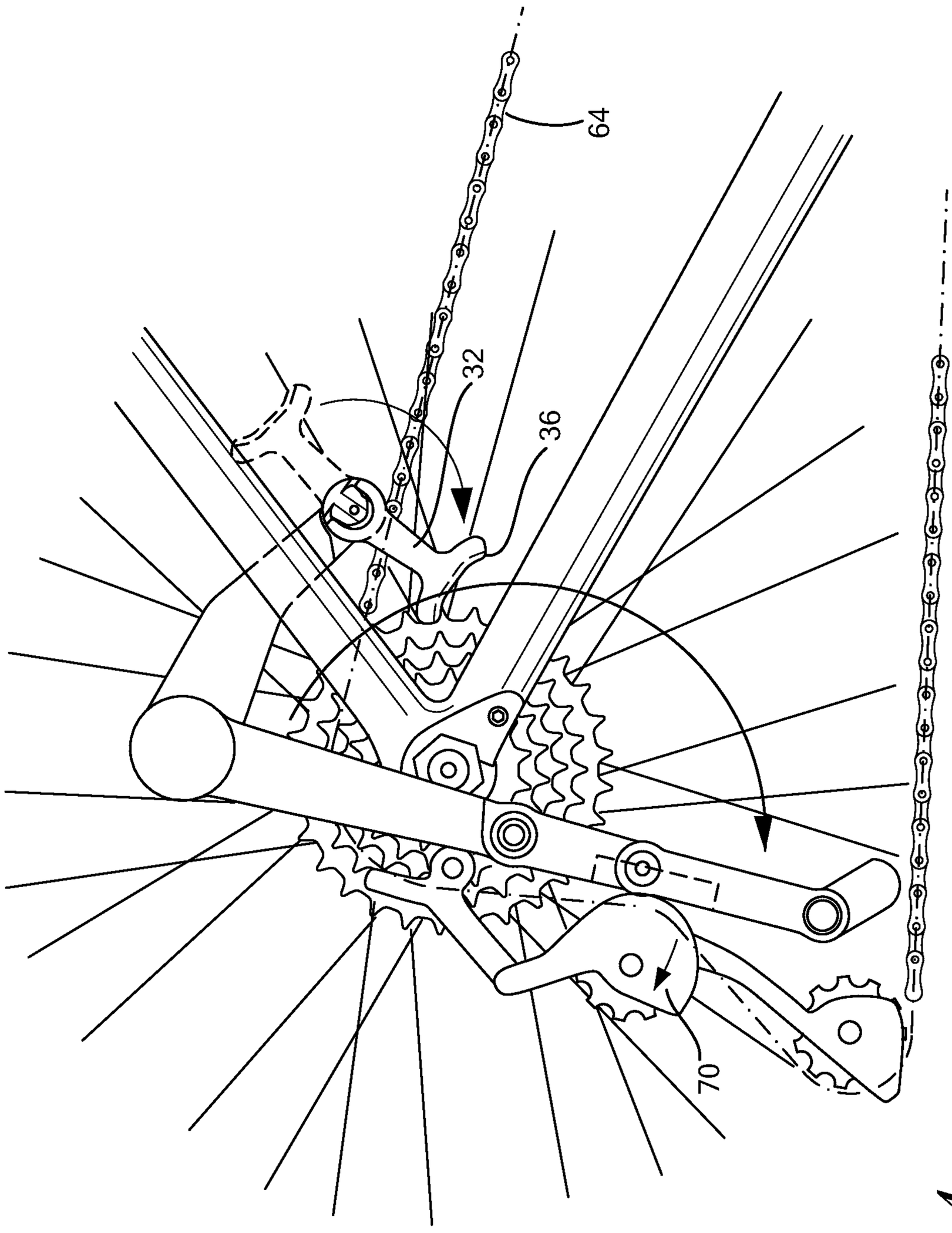

FIG. 4

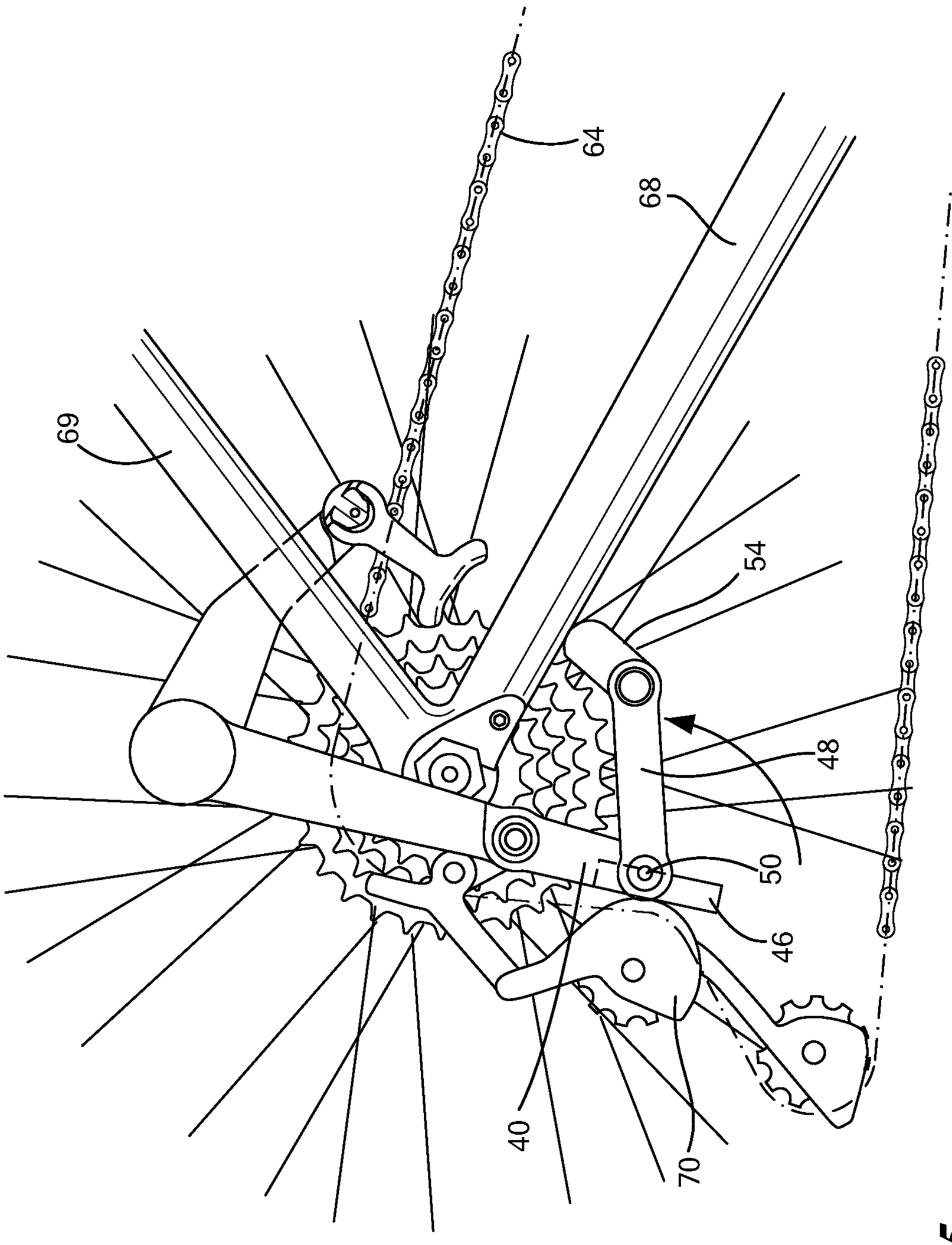

FIG. 5

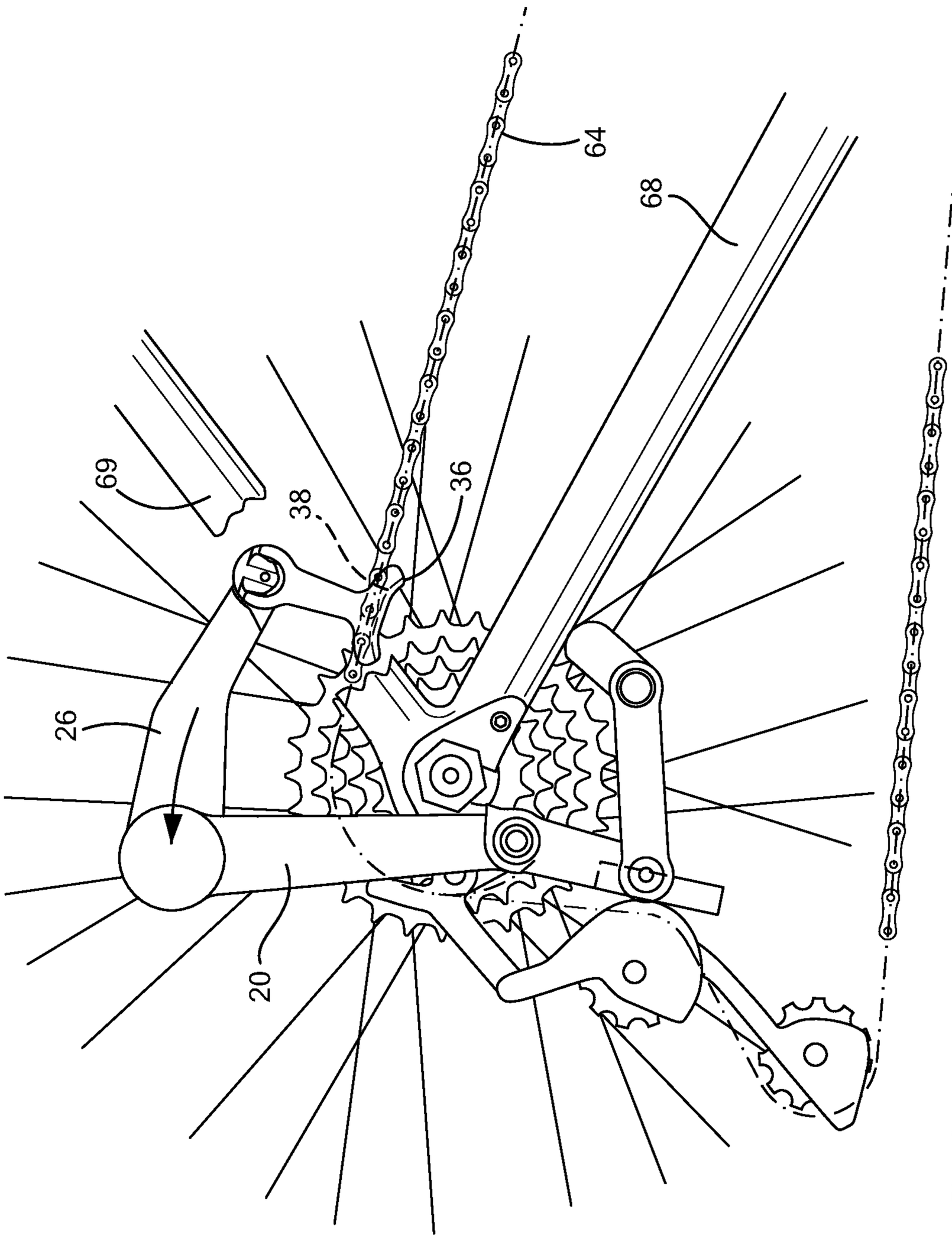

FIG. 6

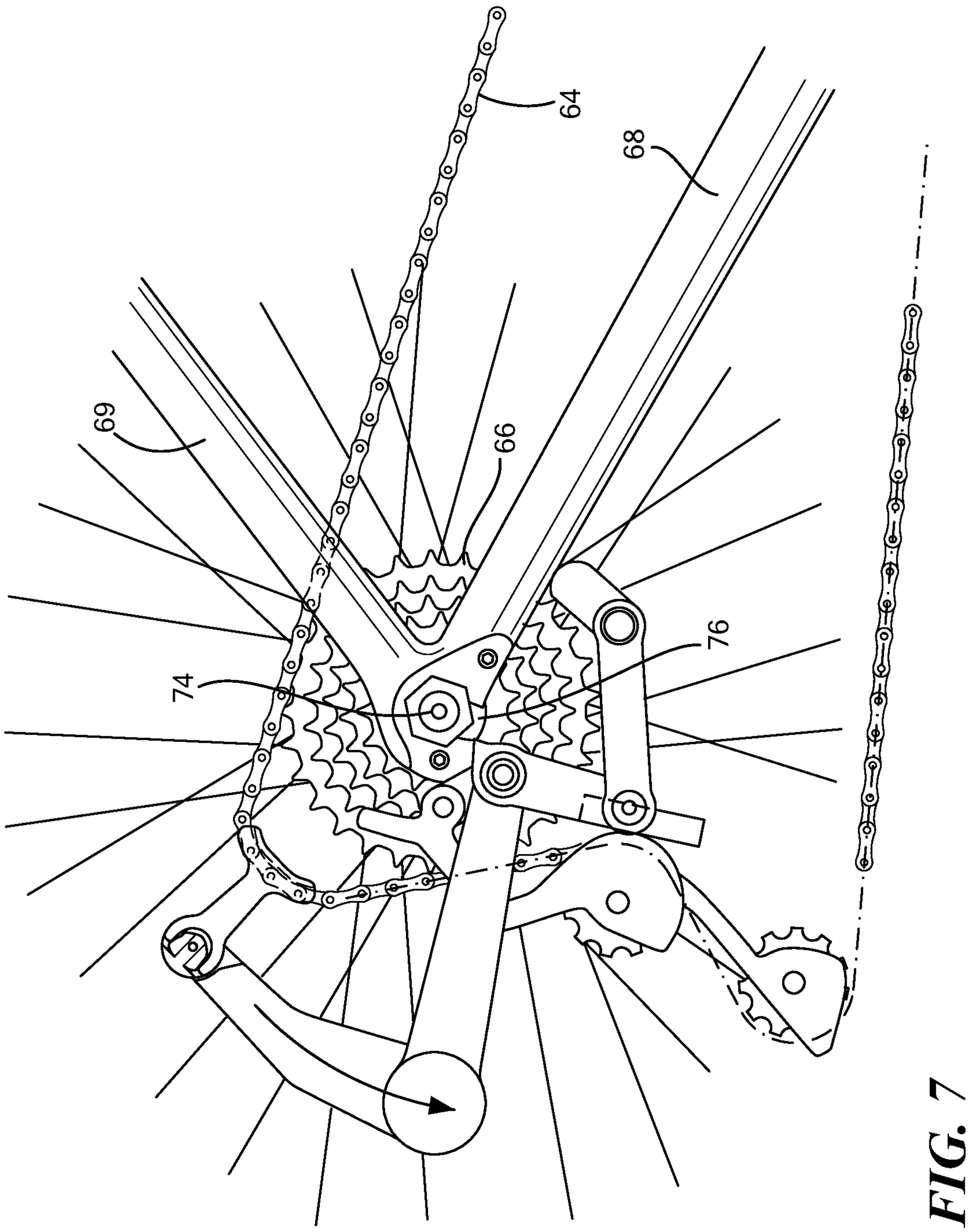

FIG. 7

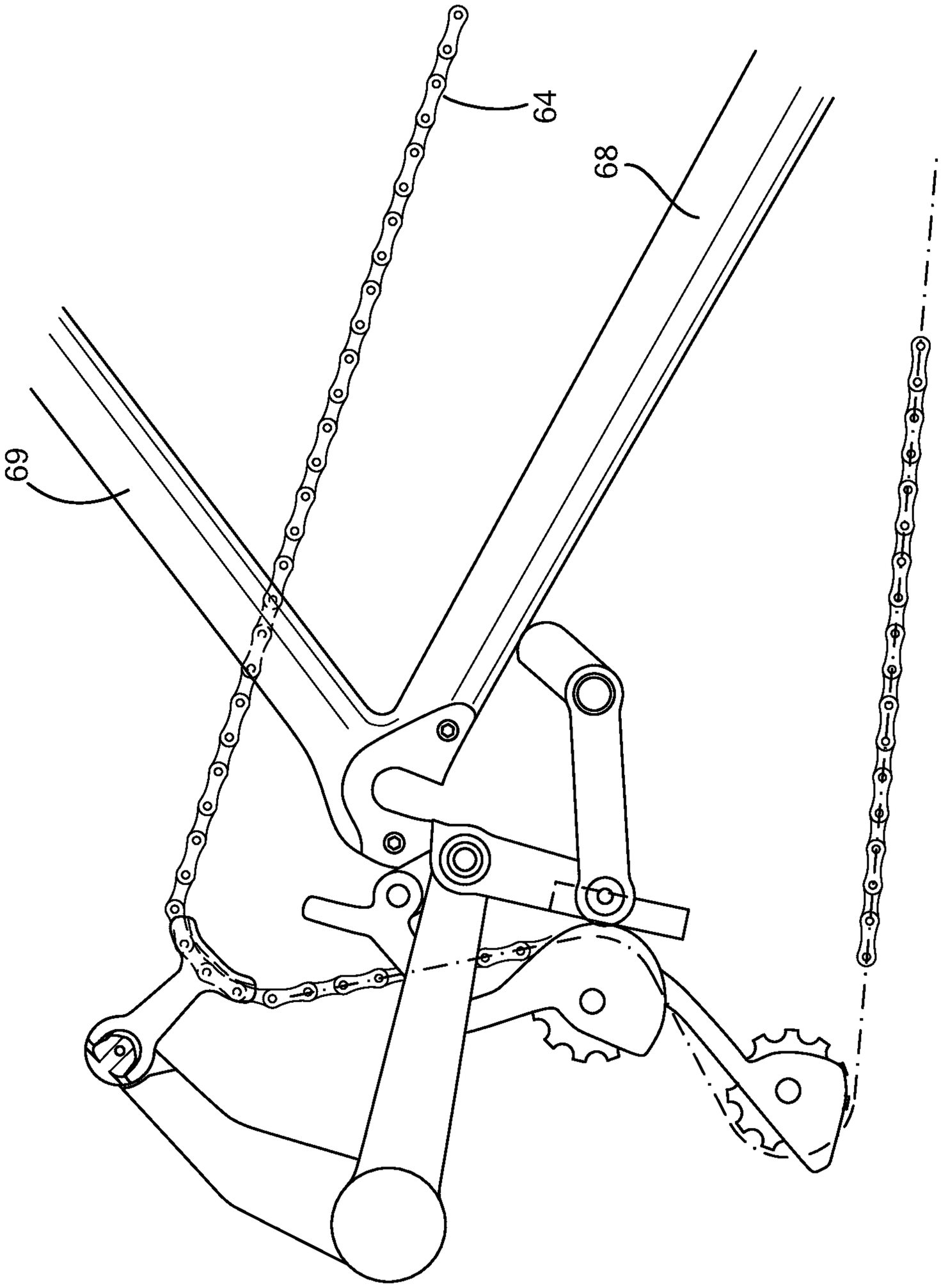

FIG. 8

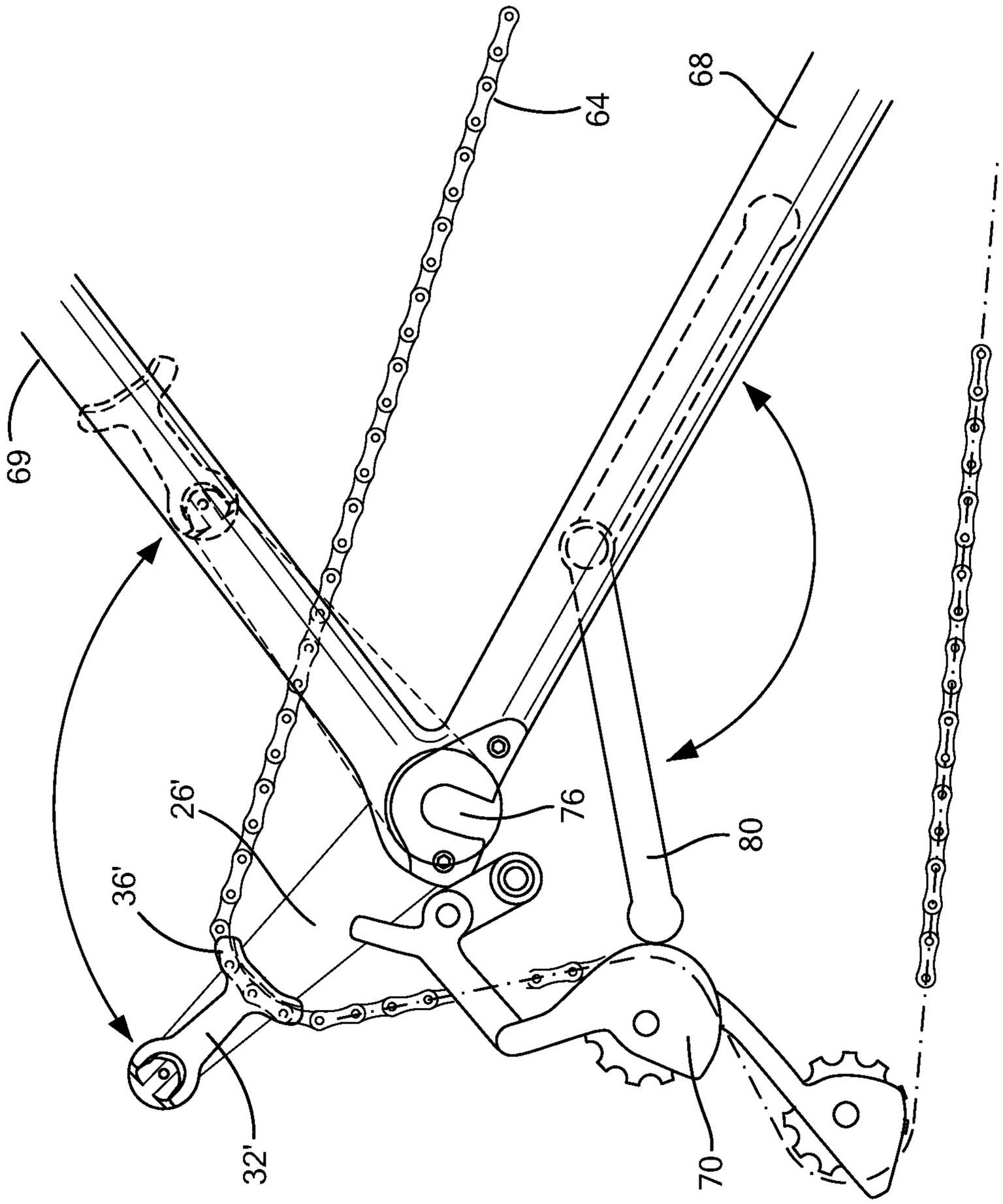

FIG. 9

CHAIN LIFT AND DERAILLEUR HOLD TOOL FOR BICYCLES

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a Continuation-in-Part application of U.S. application Ser. No. 16/124,824, filed Sep. 7, 2018, entitled CHAIN LIFT AND DERAILLEUR HOLD TOOL FOR BICYCLES the entirety of which is incorporated herein by reference.

FIELD

The disclosure is generally related to a mechanical hand tool, and more particularly to a tool for removing a chain from a gear such as a bicycle chain from a rear wheel gear cassette.

BACKGROUND

Cycling is a major global activity. Approximately 80 million bicycles are sold each year (12 million in the USA). Like most mechanical implements, bicycles require maintenance and repair. Common tasks, such as attaching a bicycle to an indoor trainer, regular maintenance, and replacement of a flat tire, require the removal of a wheel having the flat tire. While removal of a front bicycle wheel is relatively simple, removal of a rear wheel from a bicycle having a rear derailleur is widely considered a difficult and dirty task.

The rear derailleur is part of a gear shifting system, wherein the rear derailleur positions a moving chain laterally from gear to gear as desired, while maintaining appropriate tension on the chain to allow it to stay engaged with different sized gears without creating slack in the chain. Since the rear derailleur is spring loaded to maintain chain tension, it must be forced rearward and held away from the gears so that the wheel can be disengaged from the chain and the bicycle frame. Once the wheel is removed, the chain dangles and rests on the bicycle frame marring it with grease/oil and scratching the finish. Re-installing the rear wheel is typically more difficult than removal. Most often, such repairs are performed by a single person with two hands. One hand might hold the bike and the other might hold the wheel to disengage it from the bicycle frame while the person struggles to use one of the two hands to also push back the rear derailleur and disengage the greasy chain from the gears. This is both awkward and difficult.

While work-stands are known to for supporting and holding a bicycle in place for maintenance, thereby freeing up one hand, chain disengagement and wheel removal are still done by hand. There are no known tools for facilitating chain disengagement and removal of a rear wheel. Similarly, there are no known tools that are integral with a bicycle frame, or a bicycle frame having a component, that facilitate complete chain disengagement from the gears or cogs of a rear wheel cassette.

SUMMARY

A tool is disclosed for use with a bicycle, the bicycle having a frame, a rear derailleur secured to the frame, a wheel secured to the frame, the wheel having an axle mounted cassette of cogs, and a chain engaged with the rear derailleur and the axle mounted cassette of cogs. The tool includes a chain disengagement element movable with respect to the axle mounted cassette, wherein moving the chain disengagement element moves a portion of the chain away from the axle mounted cassette sufficiently to completely disengage the chain from the axle mounted cassette.

For a bicycle frame having a front portion and a rear portion, a portion of the chain disengagement element is movable toward the front portion and the rear portion of the bicycle frame and it can pivot with respect to the bicycle frame as well as move laterally and be lockable at a selected lateral displacement.

The tool can be integral with the bicycle frame as a feature or component thereof, or removably attachable thereto. For a bicycle frame with a chain stay and a seat stay, the tool can be integral with or at least partially concealed by one of them.

A locking mechanism can be included to prevent the chain disengagement element from moving to hold the chain in the disengaged position.

A derailleur hold element can be included that is movable to engage and to pivot the rear derailleur (and or associated rear cage), and the derailleur hold element can be lockable to maintain the rear derailleur in a selected position and can be integral with the bicycle frame.

A method of disengaging a bicycle chain from a bicycle having a rear derailleur and a rear wheel cassette of cogs, includes providing a tool; securing the tool to the bicycle; using the tool to pivot the rear derailleur towards the rear of the bicycle; and using the tool to lift the bicycle chain away from the rear wheel cassette of cogs. The method may further include using the tool to lock the rear derailleur in the rearward position; and using the tool to lock the chain in a position that is disengaged from the rear wheel cassette of cogs.

The details of one or more aspects of the disclosure are set forth in the accompanying drawings and the description below. Other features, objects, and advantages of the techniques described in this disclosure will be apparent from the description and drawings, and from the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete understanding of the present invention, and the attendant advantages and features thereof, will be more readily understood by reference to the following detailed description when considered in conjunction with the accompanying drawings wherein:

FIG. **1** is a perspective view of a tool in accordance with the invention;

FIG. **1**A is a perspective view of portion of the tool illustrated in FIG. **1**

FIG. **2** is a side view of a portion of a rear bicycle wheel;

FIG. **3** illustrates the tool of the invention engaged with rear bicycle wheel of FIG. **2**;

FIG. **4** shows the rear derailleur being pushed rearward by the tool;

FIG. **5** depicts a portion of the tool engaged with the bicycle frame to hold the derailleur in the rearward position;

FIG. **6** depicts a portion of the tool engaged with the chain in preparation for disengagement of the chain from the gear cassette;

FIG. **7** shows the tool being actuated to pull the chain away from the gear cassette;

FIG. **8** shows the tool engaged with the bicycle frame with the wheel removed; and

FIG. **9** illustrates the tool integrated with a bicycle frame.

DETAILED DESCRIPTION

The present invention provides a tool and method for quickly and easily removing a rear bicycle wheel. The tool attaches to a bicycle, lifts and holds the bicycle drive chain away from the cassette of cogs/gears, and pulls back and holds the rear derailleur. In a hands-free manner the invention holds the chain away from the cassette and holds the derailleur in the proper position for wheel removal, bicycle cleaning, and maintenance.

Advantages provided by the invention include: 1) making normally difficult rear wheel removal and installation easy; 2) protecting frame finish by holding the chain away from the frame when the wheel is removed; 3) allowing quick and easy wheel bearing testing while the wheel is still installed on the bicycle, but with the chain disengaged from the cassette; 4) allowing bicycle maintenance to be performed by holding the chain away from the frame when the wheel is removed; and 5) and allowing the front chain ring/crankset to be rotated while wheel is removed.

Turning now to the figures, FIG. **1** is a perspective view of a tool **10** in accordance with the invention. The tool **10** includes a securing device including a pivot point **12** and a pin **14** associated with the pivot point. The pin is shown having a first portion **16** that is received within the pivot point **12**, and a second portion **18** that extends laterally from the pivot point. The tool includes a chain lift including a first portion **20** having a first end **22** and a second end **24**, the first end being pivotable about the pivot point **12** and pin **14** of the securing device. The second end **24** extends laterally in the same direction as the pin **14**. A second portion **26** has a first end **28** and a second end **30**. The first end **28** of the second portion **26** is pivotally secured to the laterally extending element of the second end **24** of the first portion **20**. A third portion **32** has a first end **34** and a second end **36**, the first end **34** of the third portion **32** being pivotally secured to the second end **30** of the second portion **26** and pivotable longitudinally and laterally with respect to the second portion **26**. The third portion second end **36** can define a channel **38**.

Continuing to refer to FIG. **1**, a locking mechanism includes a first portion **40** having a first end **42** and a second end **44**. The first end **42** is pivotable about the pivot point **12** and pin **14** of the securing device. The second end **44** defines a first support element **46** that projects laterally in the same direction as the pin **14**. The locking mechanism further includes a second portion **48** having a first end **50** and a second end **52**. The first end **50** of the second portion **48** is pivotally secured to the second end **44** of the first portion **40**. A second support element **54** is fixed to the second end **52** of the second portion **48**. The second support has a first end and a second end.

Continuing to refer to FIG. **1**, the second end **24** of the first portion **20** can define a cavity **56** that can be covered with a cap **58**. FIG. **1**A shows how the cap can be provided with retaining elements **60**, such as clips or cavities that can receive and hold secure a variety of pins **14'**, **14"**, and **14'"** of different shape and dimension.

Each of the above described pivot points can include locking mechanisms to inhibit rotation or movement of one part with respect to another. As will be described below, the first support element **46** and the second support element **54** can be provided with padding or made of a resilient material as they are intended to contact various portions of a bicycle that it would be advantageous not to scratch or otherwise damage.

Turning now to the remaining figures, the tool **10** will be better understood in context, wherein the figures show a series of steps in the use of the tool. FIG. **2** is a side view of a portion of a right rear side of a bicycle having a wheel with spokes **62**, chain **64**, cassette of cogs/gears **66**, chain stay **68**, seat stay **69**, rear derailleur **70** (portions of the derailleur mechanism are not shown, however, the cage having two cogs and various connection points for the purpose of this disclosure is included as part of or is used interchangeable with the term derailleur), having derailleur pivot point **72**, wheel axle **74**, and dropout **76**. The dropout **76** is a notch at the end of the left (not shown) and right chain stays **68** and seat stays **69** that allows the axle of the wheel to be lowered from the bike frame for removal and replacement. For most models of derailleur, the derailleur pivot point **72** is the single attachment point of the derailleur to the bicycle frame. The derailleur pivot point **72** has a central hole or notch that the pin **14** can be inserted into.

FIG. **3**. Illustrates the tool of the invention engaged with the bike frame by inserting the pin **14** into the derailleur pivot point **72**. The pin **14** may contain a cam operated locking feature which locks the pin to the derailleur pivot point. The first support element **46** rests upon a portion of the derailleur **70**. Although a pin inserted into the pivot point is a convenient and effective device for securing the tool to the bike frame, it is contemplated that a portion of the tool could be clipped or strapped to the bike frame as well to function as the securing device. For example, the tool can be secured to one or both chain stays, and/or a pin, rod or spindle can be inserted into the axle through hole in a frame designed for disc brakes.

FIG. **4** shows the spring-biased, rear derailleur **70** being pushed rearward by the tool with sufficient force to overcome the spring bias. As used herein, "rear derailleur" includes all or any elements of the rear derailleur to include the cage of chain guides. The third portion **32** of the chain lift is rotated laterally and downward so that the second end **36** of the third portion **32** is positioned under the chain **64** to align the channel, which is slightly wider than the chain **64**, with the chain, so that in a subsequent step the chain can be received within the channel.

FIG. **5** depicts a portion of the tool engaged with the bicycle frame to hold the derailleur **70** in the rearward position. This view is similar to that of FIG. **4**. However, in this view, the second portion **48** of the locking mechanism has been pivoted upward with respect to the first portion **40** to place the second support element **54** in contact with the chain stay **68**. The second portion **48** is angled with respect to the first portion **40** thereby "locking" the portions in place to hold the derailleur **70** rearward. Alternatively, a locking mechanism can be provided at the first end **50** of the second portion **48** and the second end **44** of the first portion **40**. In this view, the first support element **46** is clearly shown in contact with the derailleur **70**. It should also be noted that the second end **24** of the first portion **20** of the chain lift extends far enough laterally so that the second portion **26** can pass behind the upper seat stay **69** and be positioned above the chain. The second portion **48**, the first support element **46**, and the second support element **54** can be made of, or surfaced with a soft or low friction material to prevent marring the surfaces of the derailleur **70** and chain stay **68** when contact is made.

FIG. **6** shows the first portion **20** being pivoted rearward about the pin **14**/derailleur pivot point **72**, causing the

second portion **26** to rise and thereby cause the chain **64** to enter the channel **38** of the second end **36** of the third portion **32**. The laterally projecting second end **24** of the first portion **20** provides a convenient "handle" to pull.

FIG. **7** shows the continuation of the pulling movement that causes the chain to be disengaged from the cassette **66**. Now the wheel axle **74** can be loosened and allowed to travel downward from the dropout **76** for removal from the bicycle.

FIG. **8** shows the tool engaged with the bicycle frame with the wheel removed.

As discussed above, the tool can be completely "self-contained" and independent of the bicycle or it can be removably securable to the frame with bolts, screws, adhesive, straps, hook and pile fasteners and the like. However, the tool can also be permanently integrated with a bicycle frame so that the bicycle frame has an integral tool component.

FIG. **9** shows a rear frame portion of a bicycle with a chain stay **68**, seat stay **69**, chain **64**, rear derailleur **70**, dropout **76**, and chain lift/disengagement element tool movable with respect to the rear of the bicycle frame (the axle mounted cassette and wheel are not shown in this view for clarity). The tool as shown includes two primary components, a chain disengagement element having a second portion **26'** connected to a third portion **32'** with a second end **36'** and a derailleur hold element **80**. The chain disengagement element moves a portion of the chain away from the axle mounted cassette sufficiently to completely disengage the chain from the axle mounted cassette by moving forward and aft, such as by rotation about a mounting point shown at/around the rear axle dropout **76**. The chain disengagement element is movable laterally and is lockable at a selected lateral displacement and biased directionally with a bias element. Thus, the chain disengagement element can be moved and held laterally away from the chain or aligned with the chain depending upon its lateral portion related to the cogs. It should be noted that while the third portion **32'** is show with a particular configuration, it could be a pin or other element attached to the second portion **26'** and rotate from a stored position to its function position (normal to the chain) and also move left and right laterally to the chain.

Continuing to refer to FIG. **9**, dashed lines on the inside face of the seat stay **69** and chain stay **68** show where the chain disengagement element and derailleur hold element can be aligned and locked into position or stored to both shield and protect the tool elements from damage and/or to at least partially conceal them for aesthetic reasons. Thus, the chain disengagement mechanism can pivot about or near the wheel axis from a stowed position to an engaged or disengaged position, wherein the act of pivoting causes engagement and then lifting and disengaging the chain from the cassette of cogs.

Continuing to refer to FIG. **9**, a derailleur hold element is movable to engage and to pivot the rear derailleur (cage) **70**. In the illustration, the dashed lines on the inside face of the chain stay show where the derailleur hold element can be aligned and locked into position or stored to both shield and protect it from damage and/or to at least partially conceal it for aesthetic reasons. Thus, the derailleur hold element can pivot from a stowed position to an engaged or disengaged position, wherein the act of pivoting causes engagement and then pushing the rear derailleur or derailleur cage rearward. The derailleur hold element can further include a locking mechanism to prevent it from moving when it is engaged with the derailleur or derailleur cage to maintain the rear derailleur in a selected position.

It will be appreciated by persons skilled in the art that the present invention is not limited to what has been particularly shown and described herein above. In addition, unless mention was made above to the contrary, it should be noted that all of the accompanying drawings are not to scale. A variety of modifications and variations are possible in light of the above teachings without departing from the scope and spirit of the invention, which is limited only by the following claims.

What is claimed is:

1. A tool for use with a bicycle, the bicycle having a frame, a rear derailleur secured to the frame, a wheel secured to the frame, the wheel having an axle mounted cassette of cogs, and a chain engaged with the rear derailleur and the axle mounted cassette of cogs, the tool comprising:

a chain disengagement element movable with respect to the axle mounted cassette, the chain disengagement element including:

a first portion having a first end and a second end, the first end pivotable with respect to a securing device, the second end having a laterally extending element;

a second portion having a first end and a second end, the first end of the second portion being pivotally secured to the laterally extending element of the second end of the first portion; and

a third portion having a first end and a second end, the first end of the third portion being pivotally secured to the second end of the second portion,

wherein moving the chain disengagement element moves a portion of the chain away from the axle mounted cassette of cogs sufficiently to completely disengage the chain from the axle mounted cassette.

2. The tool of claim **1**, wherein the frame has a front portion and a rear portion and wherein a portion of the chain disengagement element is movable toward the front portion and the rear portion of the frame.

3. The tool of claim **2**, wherein the chain disengagement element pivots with respect to the frame.

4. The tool of claim **1**, wherein the chain disengagement element is movable laterally with respect to the axle mounted cassette of cogs.

5. The tool of claim **4**, wherein the chain disengagement element is lockable at a selected lateral displacement.

6. The tool of claim **1**, wherein the tool is integral with or attached to the frame.

7. The tool of claim **1**, wherein the frame has a chain stay and a seat stay and wherein the chain disengagement element is integral with one of the chain stay and the seat stay.

8. The tool in accordance with claim **1**, further comprising a locking mechanism to prevent the chain disengagement element from moving to hold the chain in a disengaged position.

9. The tool in accordance with claim **1**, further comprising a derailleur hold element that is movable to engage and to pivot the rear derailleur.

10. The tool in accordance with claim **9**, wherein the derailleur hold element is lockable to maintain the rear derailleur in a selected position.

11. The tool in accordance with claim **9**, wherein the derailleur hold element is integral with the frame.

12. The tool of claim **9**, wherein the frame has a chain stay and a seat stay and wherein the derailleur hold element is integral with the chain stay and the chain disengagement element is integral with one of the seat stay and the chain stay.

13. The tool of claim 1, wherein the tool is removably engagable with the frame so as to be in a fixed positon with respect thereto.

14. The tool of claim 1, wherein the third portion pivots longitudinally and laterally with respect to the second portion.

15. The tool of claim 14, further comprising a bias element to bias the third portion at least one of laterally and longitudinally with respect to the second portion.

16. The tool of claim 1, wherein the chain disengagement element has a distal end portion that defines a chain engagement surface.

17. A tool integral with a bicycle, the bicycle having a frame, a rear derailleur secured to the frame, a wheel secured to the frame, the wheel having an axle mounted cassette of cogs, and a chain engaged with the rear derailleur and the axle mounted cassette of cogs, the tool comprising:

a chain disengagement element movable with respect to the axle mounted cassette, the chain disengagement element including:

a first portion having a first end and a second end, the first end pivotable with respect to a securing device, the second end having a laterally extending element;

a second portion having a first end and a second end, the first end of the second portion being pivotally secured to the laterally extending element of the second end of the first portion; and

a third portion having a first end and a second end, the first end of the third portion being pivotally secured to the second end of the second portion,

wherein moving the chain disengagement element moves a portion of the chain away from the axle mounted cassette sufficiently to completely disengage the chain from the axle;

a locking mechanism to prevent the chain disengagement element from moving to hold the chain in the disengaged position; and

a derailleur hold element that is movable to engage and to pivot the rear derailleur and lockable to maintain the rear derailleur in a selected position.

18. A bicycle frame for a bicycle having a rear derailleur secured to the frame, a wheel secured to the frame, the wheel having an axle mounted cassette of cogs, and a chain engaged with the rear derailleur and the axle mounted cassette of cogs, the bicycle frame comprising:

a chain disengagement element movable with respect to the axle mounted cassette, the chain disengagement element including:

a first portion having a first end and a second end, the first end pivotable with respect to a securing device, the second end having a laterally extending element;

a second portion having a first end and a second end, the first end of the second portion being pivotally secured to the laterally extending element of the second end of the first portion; and

a third portion having a first end and a second end, the first end of the third portion being pivotally secured to the second end of the second portion,

wherein moving the chain disengagement element moves a portion of the chain away from the axle mounted cassette sufficiently to completely disengage the chain from the axle;

a locking mechanism to prevent the chain disengagement element from moving to hold the chain in the disengaged position; and

a derailleur hold element that is movable to engage and to pivot the rear derailleur and lockable to maintain the rear derailleur in a selected position.

* * * * *